



### S4PM – Simple, Scalable, Script-based Science Processor for Measurements

<http://s4pm.sci.gsfc.nasa.gov/>

Developed for highly automated processing of science data

**Audience:** “Industrial-strength” remote sensing science data processing centers.

**Important Aspects for Reusing Software:**  
Documentation, Portability, Extensibility, Packaging, Modularity

**Benefits Realized from Reusing Software:**  
Time/Schedule, Effort, Cost, Reliability

**Issues Faced when Reusing Software:**  
Learning Curve, Support

**Important Aspects in Providing Software for Reuse:** Extensibility, Portability, Scalability, Licensing

**Issues Faced when Providing Software for Reuse:** Receiving feedback, Advertising/Exposure

**Other Statistics:** 5 known reusers, with statistics indicating up to 12 more; software is reused with significant modifications

### Benefits Realized

**Time (Schedule)** and **Effort** savings were ranked in the top three benefits for all projects.

**Cost** savings was ranked in the top three benefits for three of the four projects.

### SHAirED – Services for Helping the Air-quality community use ESE Data

<http://capita.wustl.edu/SHAirED> and <http://www.datafed.net>

Designed to deliver data and tools in support of particulate air quality management and to develop a federated PM information sharing network

**Audience:** Air quality researchers and managers.

**Important Aspects for Reusing Software:**  
Standards Compliance, Modularity, Extensibility, Documentation

**Benefits Realized from Reusing Software:**  
Reusability by Others, Effort, Time/Schedule, Reliability

**Issues Faced when Reusing Software:** Learning Curve, Support

**Important Aspects in Providing Software for Reuse:** Standards Compliance, Modularity, Support

**Issues Faced when Providing Software for Reuse:** Advertising/Exposure, Integration

**Other Statistics:** uncertain number of reusers; services are reused without modification since web services for data access, analysis, and visualization are offered for execution as distributed services

### Common Issues

Learning Curve and Support were the top two issues for three of the four projects, and Learning Curve was in the top two issues for all four projects.

Design of Reusable Software and Advertising/Exposure were important issues in providing software for reuse.

Receiving feedback was considered an issue when providing for reuse by three of the four projects.

### SOSE – Satellite Observations in Science Education

<http://www.ssec.wisc.edu/sose>

Developed a free toolkit of reusable software components for developing Internet-based learning activities which emphasize remote sensing and exploratory data analysis

**Audience:** Developers of online learning activities which utilize remote sensing data.

**Important Aspects for Reusing Software:**  
Portability, Extensibility, Discovery, Modularity, Documentation

**Benefits Realized from Reusing Software:**  
Reliability, Effort, Time/Schedule, Cost, Component-Based Development

**Issues Faced when Reusing Software:**  
Support, Learning Curve, Security, Discovery, Maintenance

**Important Aspects in Providing Software for Reuse:** Portability, Extensibility, Licensing, Standards Compliance, Documentation

**Issues Faced when Providing Software for Reuse:** Design of Reusable Software, Receiving Feedback, Advertising/Exposure, Integration, Security

**Other Statistics:** uncertain number of reusers, estimated to be low (a dozen or so); software is designed to be used without modification, with the user providing configuration information (requested features may be provided after consideration)

### Lessons Learned

**Documentation** and **Extensibility** were important aspects for all four projects reusing software.

**Modularity** was also important (in the top five) for three of the four projects.

To make software more easily reused, these aspects should be well-developed.

Ease of use, once it is determined that software is a potential reuse candidate, is extremely important.

### Resolving Issues

Software release process help, creation of a reuse standardization metric, and creation of reuse guidelines for creating reusable software were generally considered useful ways to address the issues.

Reusable software testbed/showcase to “try before you buy” may encourage reuse, especially for large and/or complex applications and systems.

Effective methods for searching and discovering services and software will assist finding reusable assets.

Shared implementations of web service oriented applications and systems helps for web services.

Users’ resistance to creating XML was addressed by using web forms to create and validate XML.

### ESDS Software Reuse Working Group Portal Web Site

<http://www.esdswg.org/softwarereuse>

Designed to provide the Earth science community with software reuse information, tools, events, news, etc.

**Audience:** The software reuse working group, other ESDS working groups, Earth science software developers.

**Important Aspects for Reusing Software:**  
Packaging, Documentation, Portability, Extensibility, Standards Compliance

**Benefits Realized from Reusing Software:**  
Time/Schedule, Effort, Cost, Reliability

**Issues Faced when Reusing Software:**  
Maintenance, Learning Curve, Security, Support, Discovery

**Important Aspects in Providing Software for Reuse:** Packaging, Portability, Support, Documentation, Modularity

**Issues Faced when Providing Software for Reuse:** Design of Reusable Software, Security, Integration, Receiving Feedback, Advertising/Exposure

**Other Statistics:** 3–5 other groups are reusers; software is reused with modifications, customizations of web site templates, as recommended by the Software Reuse Working Group

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